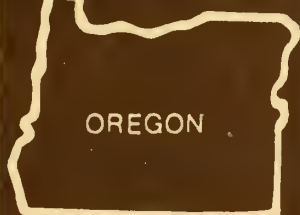


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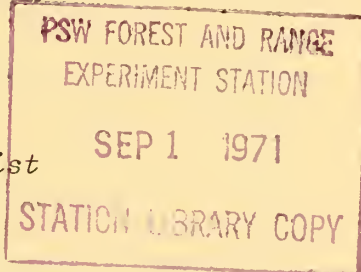
INFLUENCE OF GRAZING AND AGE ON CROWN CHARACTERISTICS IN BITTERBRUSH

by

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Abstract

*Changes in average crown diameter and percentage of dead crown were related to bitterbrush (*Purshia tridentata*) age on moderately and heavily grazed ranges. There was a significant difference in average crown diameter under the two levels of grazing intensity, but the difference between percentages of dead crown area was not significant.*

Keywords: Bitterbrush, plant age, grazing, crown characteristics.

INTRODUCTION

Changes in average crown diameter and percentage of dead crown area are widely used to measure the long-term effects of grazing on bitterbrush

shrubs.^{1/} But information is lacking on the comparative value of these and other indices of plant performance and whether they are sufficiently related to shrub age and intensity of utilization to be of significant management value. Although limited, the following data should interest range and wildlife workers because it questions the effectiveness of these criteria and indicates a need for additional evaluation.

METHODS

A fence-line comparison was made between two bitterbrush populations growing on the same uniform site near Lakeview, Oreg. Except for grazing and grazing-related factors, growing conditions were essentially the same for both study populations, and the effect of location was assumed to be unimportant. Shrubs on one side of the fence had been heavily grazed (80- to 90-percent removal of current twig production) for a prolonged period by cattle--generally during the spring and early summer; and their crowns were low, compact, and tightly hedged. Plants on the other side of the fence had been light to moderately grazed (30- to 50-percent use of current twigs) by cattle for an equally long time during late summer and fall, and their crowns were more open and spreading. All plants were protected from grazing during the growing season when study observations were made.

After field collections were completed, we grouped plants into rough stem-diameter size classes to get representative cross sections of plant ages. Ages were determined by counting growth rings on finely sanded stem sections with a low-power binocular microscope.

RESULTS AND DISCUSSION

The relationships between age of bitterbrush and average crown diameter on the heavily and moderately grazed study areas are presented in figure 1.

^{1/} William P. Dasmann. Some deer range survey methods. Calif. Fish and Game Comm. 31(1): 43-52. 1951.

Kenneth W. Parker. A method for measuring trend in range condition on National Forest ranges with supplemental instructions for measurement and observation of vigor, composition, and browse. U.S. Forest Serv., Washington, D. C. 26 p., illus. 1954.

David R. Patten and John M. Hall. Evaluating key areas by browse age and form class. J. Wildlife Manage. 30: 476-480, illus. 1966.

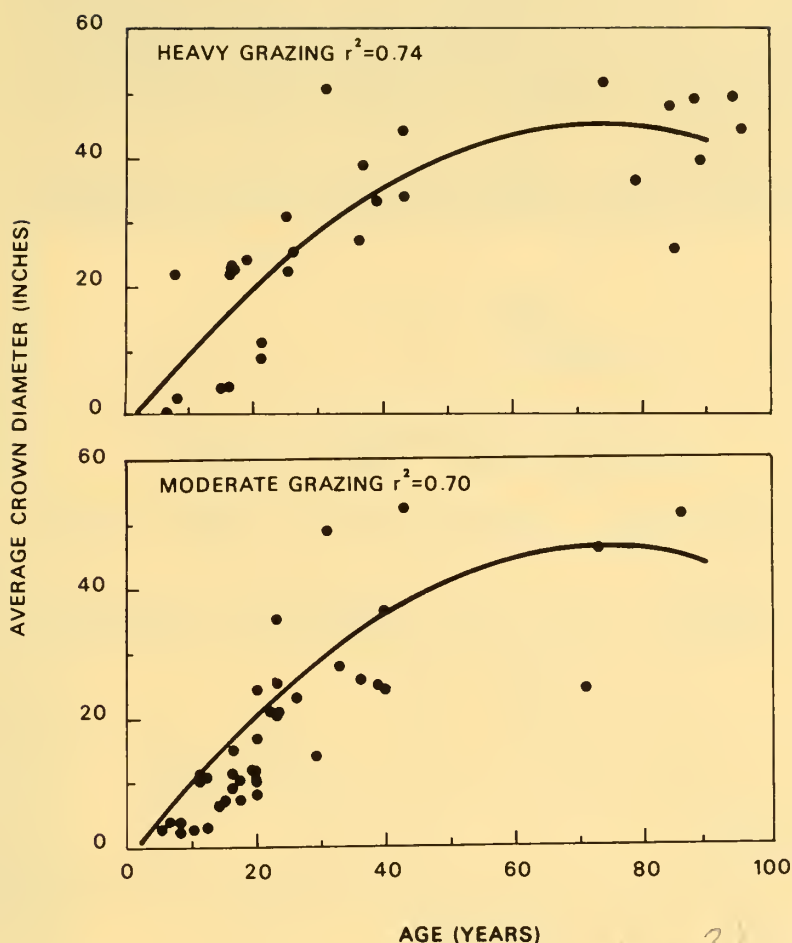


Figure 1.--*Relationship between average crown diameter and age of bitterbrush under moderate and heavy grazing.*

Significant curvilinear regressions were found which indicated that shrub age accounted for about 70 percent of the variation in average crown diameter among moderately grazed shrubs and 74 percent of the total variation in average crown diameter among heavily grazed shrubs. Thus, average crown diameter and age were reasonably related among shrubs receiving a given grazing intensity treatment, but the difference between the crown diameter and age regressions for the two grazing treatments was barely significant at the 0.05 probability level. This suggests that changes in average crown diameter may not be quite as sensitive to changes in grazing as managers often assume.

Figure 2 shows the relationships between age of bitterbrush and percentage of dead crown on heavily and moderately grazed shrubs. As can be

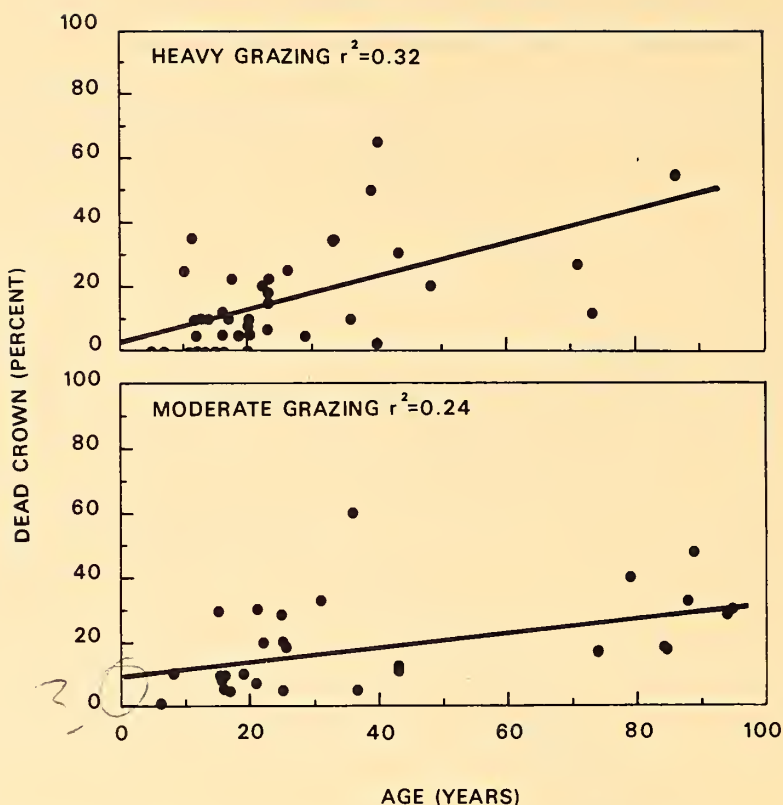


Figure 2.--*Relationship between percentage of dead crown and age of bitterbrush under heavy and moderate grazing.*

seen, weak linear relationships were found which indicated that only 24 percent of the total variation in percentage of dead crown was related to shrub age under moderate grazing compared with 31 percent under heavy grazing. More important, covariance analysis indicated that the two regressions did not differ significantly at the 0.05 probability level. Thus, under the conditions of our study, change in percentage of dead crown was poorly correlated with change in grazing intensity.

As indicated, the results of our study should be of particular interest to range and wildlife managers because they demonstrate the comparative usefulness of these criteria in measuring the response of bitterbrush plants of different ages to different intensities of grazing. We found that neither criterion was entirely satisfactory, but of the two, average shrub crown diameter appeared to have more potential management value. It, too, may have limited value unless sharp differences in grazing intensity are involved. By comparison, changes in percentage of dead crown area appeared to be of questionable management value even when extreme differences in grazing intensity are compared. Additional data are needed, however, before these criteria can be fully evaluated.